

## ABSTRACT

New methods are described for creating embossing tools with precision alignment capability using photo-definable materials plus electroformed nickel. A method for providing layer-to-layer alignment accuracy of  $\pm 2$  microns is described, as well as a method for selectively  
5 heating only the topmost layer in a stack of imprinted layers. A guard rail structure is described for protecting the embossed circuits from compaction and for providing a limit stop during each imprint cycle. The method of vapor-assisted release of an imprinting tool is also described. Fabrication equipment including an embossing machine with co-resident alignment and imprinting capabilities is presented. The proposed embossing methods can be applied to printed  
10 circuit substrates in the form of semiconductor wafers or flat panels.